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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,494	09/26/2003	Amilcar R. Arvelo	FIS920030258	3529

7590

08/03/2005

Frederick W. Gibb, III  
McGinn & Gibb, PLLC  
Suite 304  
2568-A Riva Road  
Annapolis, MD 21401

EXAMINER
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VORTMAN, ANATOLY

ART UNIT	PAPER NUMBER
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2835

DATE MAILED: 08/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/672,494	Applicant(s) ARVELO ET AL.	
	Examiner Anatoly Vortman	Art Unit 2835	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 June 2005 (Election).
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 8-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Specie I, claims 1-7, in the reply filed on 06/22/05 is acknowledged. Non-elected claims 8-26 have been withdrawn from further consideration on the merits.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-7, are rejected under 35 U.S.C. 103(a) as being unpatentable over US/5,819,402 to Edwards et al., (Edwards) in view of US/6,091,603 to Daves et al., (Daves).

Regarding claim 1 and 4, Edwards disclosed (Fig. 2) a cooling structure for an integrated circuit structure having multiple integrated circuit chips (51-55), said cooling structure comprising: a heat dissipating structure (50) connected to the upper sides of said integrated circuit chips (51-55) through a thermally conductive material (71-75), wherein said thermally conductive material (71-75) is positioned in gaps (61-65) between the upper sides of said integrated circuit chips (51-55) and the bottom of said heat dissipating structure (50), and

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wherein the smallest of said gaps (61, 63) exists between the top of the integrated circuit chip (51, 53) that produces the most thermal energy, relative to the other integrated circuit chips (52, 54, 55), and the bottom of said heat dissipating structure (50) (column 7, lines 19-27), but did not disclose a plurality of heat spreaders, wherein the lower side of each of said heat spreaders is connected to the top of a corresponding one of said integrated circuit chips and a heat dissipating structure connected to the upper sides of said heat spreaders through the thermally conductive material.

Daves disclosed (Fig. 2) a cooling structure for an integrated circuit structure having multiple integrated circuit chips (600) (column 4, line 64), said cooling structure comprising a plurality of heat spreaders (104), wherein the lower side of each of said heat spreaders (104) is connected to the top of a corresponding one of said integrated circuit chips (600) through a thermal adhesive (200) and a heat dissipating structure (100) connected to the upper sides of said heat spreaders (104) through the thermally conductive material (103) for enhancing thermal performance of the module (column 5, lines 43-46).

Since inventions of Edwards and Daves are from the same field of endeavor (cooled multi-chip modules), the purpose of the heat spreaders taught by Daves will be recognized in the invention of Edwards.

It would have been obvious to a person of ordinary skill in the cooling art at the time the invention was made to provide a heat spreader in the thermal path of each of the plurality of the integrated circuit chips of Edwards, according to the teachings of Daves, in order to augment the rate of the heat exchange and to enhance the cooling performance of the device of Edwards.

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Regarding claims 2 and 3, the official notice is taken of the fact that it was well known in the cooling art at the time the invention was made that thickness and the material of the heat spreader affects thermal conductivity of the thermal path in which said heat spreader is positioned.

Thus, it would have been obvious to a person of ordinary skill in the cooling art at the time the invention was made to provide said heat spreaders of the Edwards-Daves combination with different thicknesses and different coefficients of thermal conductivity, in order to achieve desired thermal coupling between each particular semiconductor chip and the heat dissipating structure.

Regarding claim 5, Edwards disclosed that said thermally conductive material (71-75) comprises a plurality of thermally conductive materials having different coefficients of thermal conductivity (column 7, lines 13-18).

Regarding claim 6, Edwards disclosed that said thermally conductive material is a thermal grease (column 7, line 8).

Regarding claim 7, Edwards disclosed (Fig. 2) that said integrated circuit chips comprise at least one higher power chip (51, 53) and at least one lower power chip (52, 54, 55), wherein, during operation, said higher power chip (51, 53) generates more thermal energy than said lower power chip (52, 54, 55) (column 7, lines 19-27).

### ***Conclusion***

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4. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure:

US/20020038704, 20030153665, 20030203181, 20040081843, 5094769, 5880524, 5966290, 6058015, 6251709, 6275381, and 6444496 disclosed various cooling arrangements for semiconductor devices utilizing thermally conductive materials positioned in gaps between the heat source(s) and heat dissipation structure(s).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anatoly Vortman whose telephone number is 571-272-2047. The examiner can normally be reached on Monday-Friday, between 10:00 am and 6:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Lynn Feild can be reached on 571-272-2092. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anatoly Vortman  
Primary Examiner  
Art Unit 2835

AV

